No.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION (CDR)
REPUBLIC OF LEBANON

THE STUDY
OF
ENVIRONMENTAL FRIENDLY INTEGRATED TRANSPORTATION PLAN
FOR
GREATER TRIPOLI

FINAL REPORT

MAIN REPORT - 2

SHORT-TERM IMPROVEMENT PLAN

DECEMBER 2001

KATAHIRA & ENGINEERS INTERNATIONAL

SSF
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PREFACE

In response to a request from the Government of Republic of Lebanon, the Government of Japan decided to conduct "The Study of Environmental Friendly Integrated Transportation Plan for Greater Tripoli in the Republic of Lebanon" and entrusted the Study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a Study Team headed by Mr. Tsuneo BEKKI, Katahira & Engineers International to Lebanon, at three different times between October 2000 and December 2001. In addition, JICA set up an Advisory Committee Headed by Dr. Hirohito KUSE, Tokyo University of Mercantile Marine, which examined the Study from technical points of view.

The team held discussions with the officials concerned of the Government of Lebanon, and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present Final Report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relationship between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Lebanon for their close cooperation extended to the Study.

December 2001,

Takao KAWAKAMI
President
Japan International Cooperation Agency

Mr. Takao KAWAKAMI
President
Japan International Cooperation Agency
Tokyo, Japan

December 2001

Dear Mr. Kawakami,

Letter of Transmittal

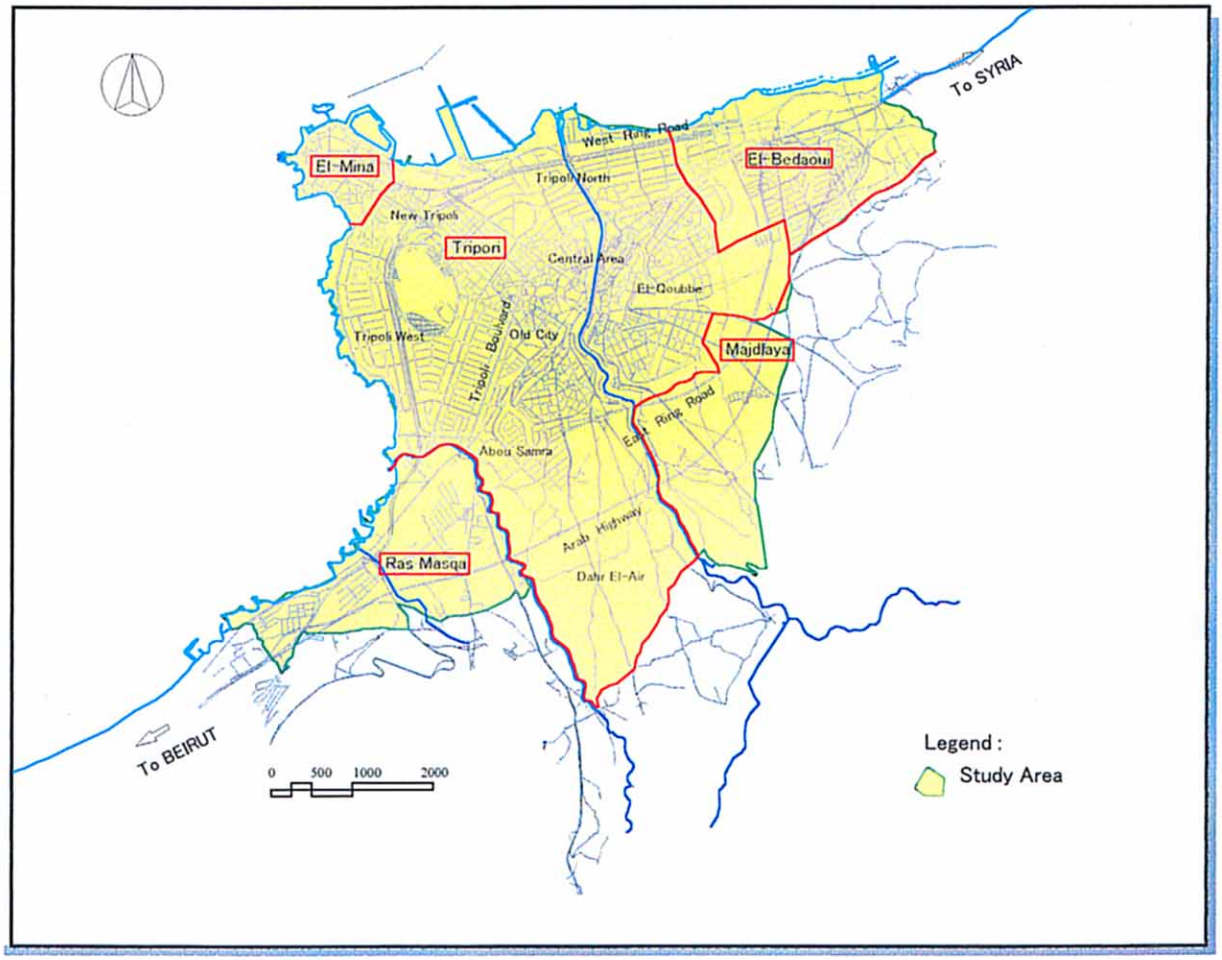
We are pleased to submit to you the report of "The Study of Environmental Friendly Integrated Transportation Plan for Greater Tripoli in the Republic of Lebanon". The report includes the advises and suggestions of the authorities concerned of the Government of Japan and your agency as well as the comments made by the Council for Development and Reconstruction and other authorities concerned in the Republic of Lebanon.

The report analyses the present and future conditions and demand of transport in Greater Tripoli. It comprehensively covers the transport sectors of road, public transport, transport management as well as the issues institution, legislation, financing and environment. The report presents the established Integrated Transport Plan to the year 2020, and the Short-term Improvement Plan for urgent projects to be implemented in the years 2001 - 2005. The output of the Study concludes that the plans are technically, environmentally, economically and socially viable, and will contribute to the development of transportation in Greater Tripoli. In view of the urgency of developing the transport facilities in Greater Tripoli, we recommend that the Government of Lebanon implement the projects with top priority.

We wish to take this opportunity to express our sincere gratitude to your agency, the Ministry of Foreign Affairs and the Ministry of Land, Infrastructure and Transport. We also wish to express our deep gratitude to the Governmental Agencies concerned in the Republic of Lebanon for the close cooperation and assistance extended to us during the Study. We hope this report will contribute to the development of Greater Tripoli.

Very truly yours,

Mr. Tsuneo BEKKI
Team Leader
of the Study of Environmental Friendly
Integrated Transportation Plan for Greater Tripoli
in the Republic of Lebanon



LOCATION MAP

REPORT COMPOSITION

The Final Report of the Study is structured to meet the requirements of each user-group. It contains an executive summary, two main reports and six technical reports as follows:

EXECUTIVE SUMMARY: is designed to address the decision-makers as ministers and politicians who do not need deep information in technical and engineering aspects. It contains brief information on all the aspects of the Study and concentrates on the input and output of each aspect. It has also a more concentrated summary for the main conclusions in two pages.

MAIN REPORT – 1 "Integrated Transport Plan": is designed for planners and directors of CDR and concerned ministries and authorities, who need more technical information on the Master Plan formulation. It contains applied planning policies, development and evaluation of alternatives, main information on the plan of each sector, evaluation results of the Master Plan and the overall implementation plan.

MAIN REPORT - 2 "Short-term Improvement Plan": integrates more detailed studies and information on the urgent projects included under the Short-term Improvement Plan. The report gives the necessity, objectives, preliminary design, cost estimate and project evaluation on the technical, environmental and economic viability of each project.

TECHNICAL REPORT - 1 "Traffic Analysis and Forecast": is basically prepared for technology transfer purposes. It addresses transport planners and contains the forecast procedures of forecasting future transport demand. The procedure starts with traffic surveys and analysis, socioeconomic framework, trip generation and attraction and the future transport demand.

TECHNICAL REPORT - 2 "Road Network Plan": is for the specialists in the road planning and network development. It includes the present road network pattern as well as the planning concept and strategies, which are the basis of the proposed network pattern. Projects of the developed plan are prioritized for implementation under each of the planning periods.

TECHNICAL REPORT - 3 "Public Transport Plan": is for the specialists in the public transport sector and schemes planned under the Master Plan. It includes the estimated future demand, proposed routes, required number of buses and cost estimation in addition to the implementation plan. It includes also plans and measures for taxi service and school buses.

TECHNICAL REPORT - 4 "Traffic Management": is for the specialists in the traffic management sector and projects included under the Master Plan. It demonstrates the problems under existing conditions and the formulated plan that includes different procedures and measures for traffic signalization, parking control as well as safety and education measures.

TECHNICAL REPORT - 5 "Environmental Assessment": gives the environmental conditions and initial environmental examination for the Study Area. Through an environmental impact study, it highlights the environmental issue in establishing the urban transport plan in order to emphasize the importance of preserving and improving the environment.

TECHNICAL REPORT - 6 "Project Management and Financing": is addressing the administrative issues that will affect the successful implementation of the planned projects. It includes the present legislation, organization and funding system of agencies that will implement the projects under the Study. For the successful implementation of the projects as scheduled, management and financing plans are presented.

APPENDIX

MAIN REPORT - 2
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LIST OF ABBREVIATIONS

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADT	Average Daily Traffic
B/C	Benefit-Cost Ratio
BOT	Built, Operate and Transfer
CAS	Central Administration of Statistics
CBD	Central Business District
CDR	Council for Development and Reconstruction
CEGP	Council Executive des Grand's Projects
CNG	Compressed Natural Gas
CO	Carbon Monoxide
COM	Council of Ministers
DGHB	Directorate General of Highways and Buildings
DOR	Directorate of Road
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
ERM	Environmental Resource Management
EU	European Union
FAR	Floor Area Ratio
FHWA	Federal Highway Administration
FYDP	Five Year Development Plan
GDP	Gross Domestic Products
GNP	Gross National Products
GOJ	Government of Japan
GOL	Government of Lebanon
HC	Hydrocarbon
HCM	Highway Capacity Manual
IBRD	International Bank for Reconstruction and Development
IEE	Initial Environmental Examination
ISF	Internal Security Force
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
LL	Lebanon Lira, Lebanon Pound
LOS	Level of Service
LRT	Light Railway Track
MEA	Middle East Airlines
M/P	Master Plan
MOE	Ministry of Environment
MOF	Ministry of Foreign Affairs
MOMRA	Ministry of Municipal and Ruler Affairs
MOI	Minister of Interior
MOPWT	Ministry of Public Works and Transport

MPWT	Ministry of Public Works and Transportation
NAC	Noise Abatement Criteria
NERP	National Emergency Reconstruction Program
NGOs	National Governmental Organizations
NO	Nitrogen Dioxide
NPV	Net Present Value
OD	Origin-Distention
ODA	Official Development Assistance
O & M	Operation and Management
ORRPT	Office of Rail Road & Public Transport
PCE	Passenger Car Equivalent
PCU	Passenger Car Unit
PDR	Plan Dimension Ratio
PIU	Project Implementation Unit
PMT	Project Management Team
RC	Reinforced Concrete
RER	Real Estate Registry
ROW	Right of Way
STRADA	JICA System for Traffic Demand Analysis
TCC	Technical Coordination Committee
TSP	Total Suspended Particulate
TTC	Travel Time Cost
UNICEF	United Nation Children's Fund
USEPA	United State Environmental Protection Agency
V/C	Volume-Capacity Ratio
VOC	Vehicle Operating Cost
WHO	World Health Organization
WTW	Water Treatment Works

CHAPTER 1

TASKS INTEGRATION OF SHORT-TERM IMPROVEMENT PLAN

CHAPTER 1

PROJECTS OF SHORT-TERM IMPROVEMENT PLAN

1.1 SHORT-TERM IMPROVEMENT PLAN

The Study on Transportation Plan for Greater Tripoli is composed of two main phases. First phase is to formulate an urban Transport Master Plan for Greater Tripoli. Second phase is to formulate the short-term (2000-2005) improvement plan.

Projects in the Short-term Improvement Plan are presented in Table 1.1-1 with their status.

Table 1.1-1 Projects in Short-Term Improvement Plan

Project Code	Project Name	Length (km)	Short Term Plan					Status
			1	2	3	4	5	
A	Road Improvement and Widening							
A06	Ras-Maska-Kousba Road	5.0						Local Fund
A09	Behsass (Old) Highway	3.6						Local Fund
B	New Road Construction							
B01	East Ring Road	8.5						Islamic Bank Fund
C	Grade Separation / Underpass							
C01	Tripoli Boulevard Underpass	0.985						(High Priority)
D	Public Transport							
D01	Public Bus							Studies are prepared by France and Lebanon (including Behsass Transport Center)
D02	Taxi							
D03	School Bus							
E	Traffic Management							
E01	Signals							Transport Management Project (High Priority)
E02	Signs							
E03	Marking							
E04	Pedestrian Overpass / Underpass							
E05	Parking							Local / BOT Fund
E06	Education / Safety							Local
E07	Enforcement							Local

Projects under the Short-term Improvement Plan have the objective of providing quick and effective solutions, actions and measures to solve severe transport and traffic problems in the Study Area. As concluded in previous sections, Central Tripoli is the most suffering area from both traffic congestion and environmental deterioration. Projects to solve problems in this area are expected to generate high positive impact on both social and natural environment.

Selection Criteria
A selection criteria was established and applied on all the projects included under the first 5-year Plan to identify projects to be subject to further technical, environmental and economic studies during the second phase of the Study, which aims to formulate an integrated Short-term Improvement Plan.

1) Urgency
Projects will be in urgent need for implementation, and to be intended to improve the environment and to solve related traffic problems.

2) Integration
Selected projects for further studies under this phase will provide integration with city and land-use planning activities and between both hard and soft measures.

3) Positive Environmental Impact
Projects are selected to improve the natural and social environment of the city, to increase the green area and to provide positive impacts environment.

4) Project Maturity
Projects should have the readiness for implementation while those involving the acquisition of right of way and relocation of residents are given the low priority.

5) Study Example
A study with technical, economic and environmental depth is expected to show an example of solving traffic problems involving a new technology.

6) Project scale
High priority projects are preferable to have the big scale in terms of impact so that the actualization of the Master Plan will be accelerated.

Under this criteria, the following three projects have been selected as the projects with highest priority for more detailed studies in the second phase of the Study:

1. Tripoli Boulevard Underpass Project
2. Central Tripoli Transport Management Project
3. Behsass Transport Center Project (the study is prepared by MOPWT)

Information prepared through the MOPWT on the third project, as the responsible agency and landowner of the project, are presented in this Chapter. Projects 1 and 2 are found to compose one package for implementation as an integrated project for both hard and soft measures, which are closely interconnected and come into effect by supporting each other to attain the intended objectives. Other projects in the plan will be subject to review and updating as they have already some preparation works and studies through other fund resources.

Figure 1.1-1 shows the location of the Tripoli Central Area. The boundaries of the area are selected to cover the Central Business District (CBD) and extended to cover all the near surrounding commercial streets like Azmi St., Touristic areas, old downtown market area and the shopping area along Abou Ali River.

Figure 1.1-2 shows location map of the short-term projects.

1.2 TRIPOLI BOULEVARD UNDERPASS PROJECT

Tripoli Boulevard as shown in Figure 1.1-1 is the major corridor pass through the middle of Tripoli city. The central section of this corridor from Halim Abu Ezz El-Dean Roundabout to Bisar Street is the most congested section. The Study recommends constructing an underpass along this central section to alleviate traffic congestion and to provide anti-pollution facility for the improvement of environmental condition. Due to the present and future traffic volumes, this project is recommended in the short-term plan. In the short-term plan the following tasks for this project are considered:

- Clarify The Project Objectives
- Present Condition of Tripoli Boulevard Central Section
- Monitoring and Modeling of Environment Condition
- Alternative of Plan Alignments and Selecting The Best Plan
- Preliminary Design
- Construction Plan and Cost Estimate
- Project Evaluation
- Implementation Organization and Fund Plan

1.3 CENTRAL TRIPOLI TRANSPORT MANAGEMENT PROJECT

The Central Area of the city shown in Figure 1.1-1 is characterized with heavy traffic congestion that severely feed back badly in the environmental condition of the city. Therefore, under the Study,

transport management in the central area of Tripoli was recommended within the Short-Term Plan to mitigate the traffic congestion in the city and consequently improve the city environment that will contribute to human health.

Under this project the following tasks are considered:

- Bus/Taxi Service System and Terminals.
- One-Way Traffic System.
- On-Street and Off-Street Parking.
- Intersection Improvements and Traffic Signals.
- Traffic Safety Facilities.
- Traffic Signs and Road Marking.
- Implementation and Fund Plan.
- Cost Estimate.
- Project Evaluation.
- Implementation Plan.

1.4 BEHSASS TRANSPORT CENTER

During the development of the city, an informal bus/taxi terminal grew in the City Center at Al-Taal Square. Due to taxi oversupply, many taxis do illegal double-parking that reduces the rod capacities significantly. This terminal cannot serve the intercity buses. Buses are parking on streets near to Al-Taal Square and almost block the roads in front of through traffic.

Before the civil war, the railway line to the north was very active in handling passengers and goods. When the railway infrastructure was destroyed during the war, the buses cover the shortage happened.

Since Tripoli is the capital of the North Lebanon, a high increase in transport demand is generated while the terminal facility does not exist due to the limited land in the Central Area.

To construct a terminal, there is a reasonable location belong to the Rail Roads and Public Transport Authority that is located in the south side of Tripoli. The location is shown in Figure 1.1-1 and it was the location of the railway station before the civil war.

The connection between this new terminal and different destinations inside the Study Area will be depended on the introducing of the city bus services and control management over shard taxi services. The implemented plan aims to construct a multi-function terminal at this location to serve the intercity buses, intercity taxis, city buses, city taxis, trucks and private cars. The terminal will includes also a commercial shopping center.

There is on-going implementation under the management of Ministry of Public Work to built a terminal in this abovementioned location to looks like the one constructed in Beirut (Sharal El-Helou). Therefore, this plan is included in the Short-Term Plan of this Study. Under this plan the following have been considered:

- Objectives
- Location
- Project Function
- Transport Requirements
- Implementation Plan

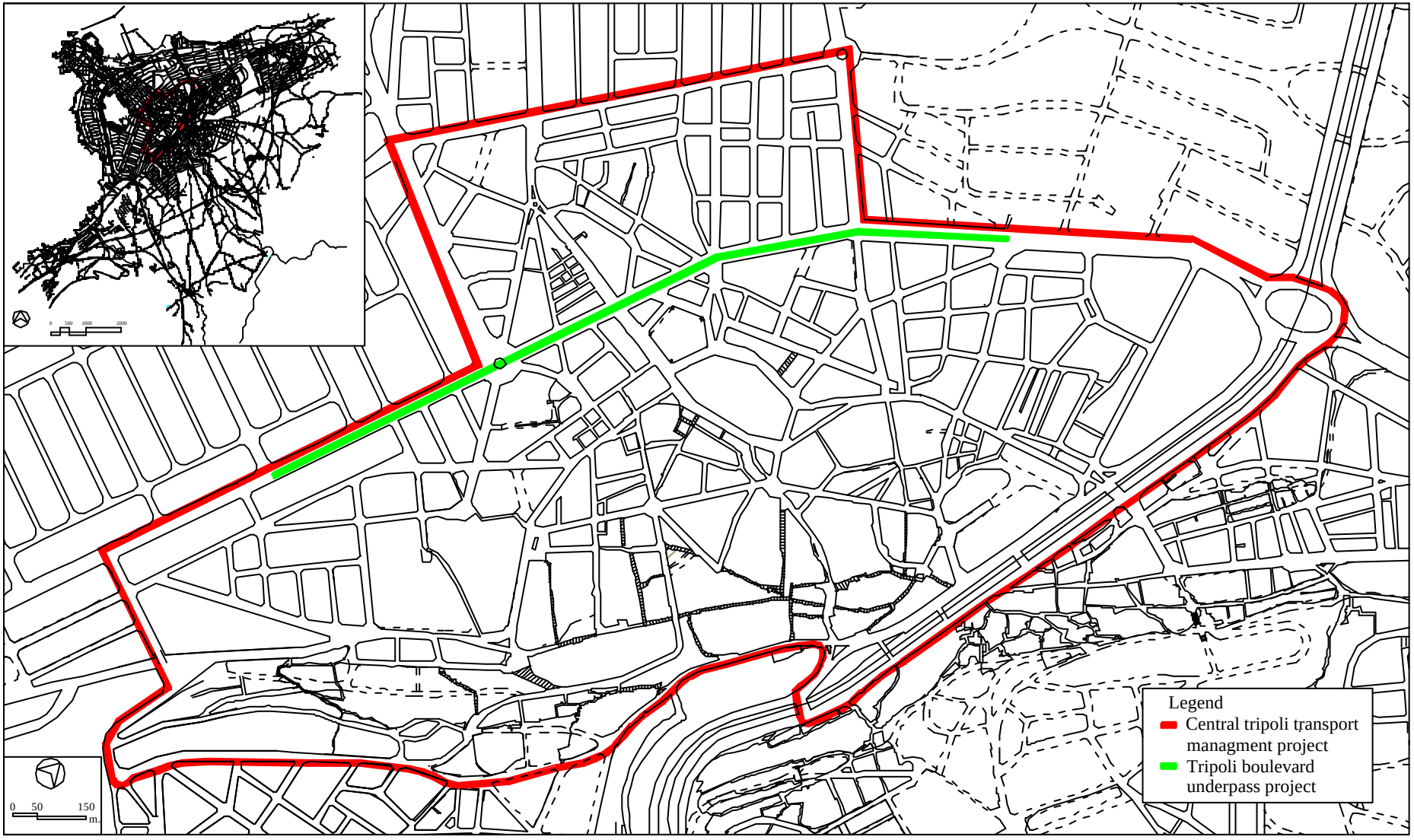

Figure 1.1-1 Major Components of Short-Term Plan

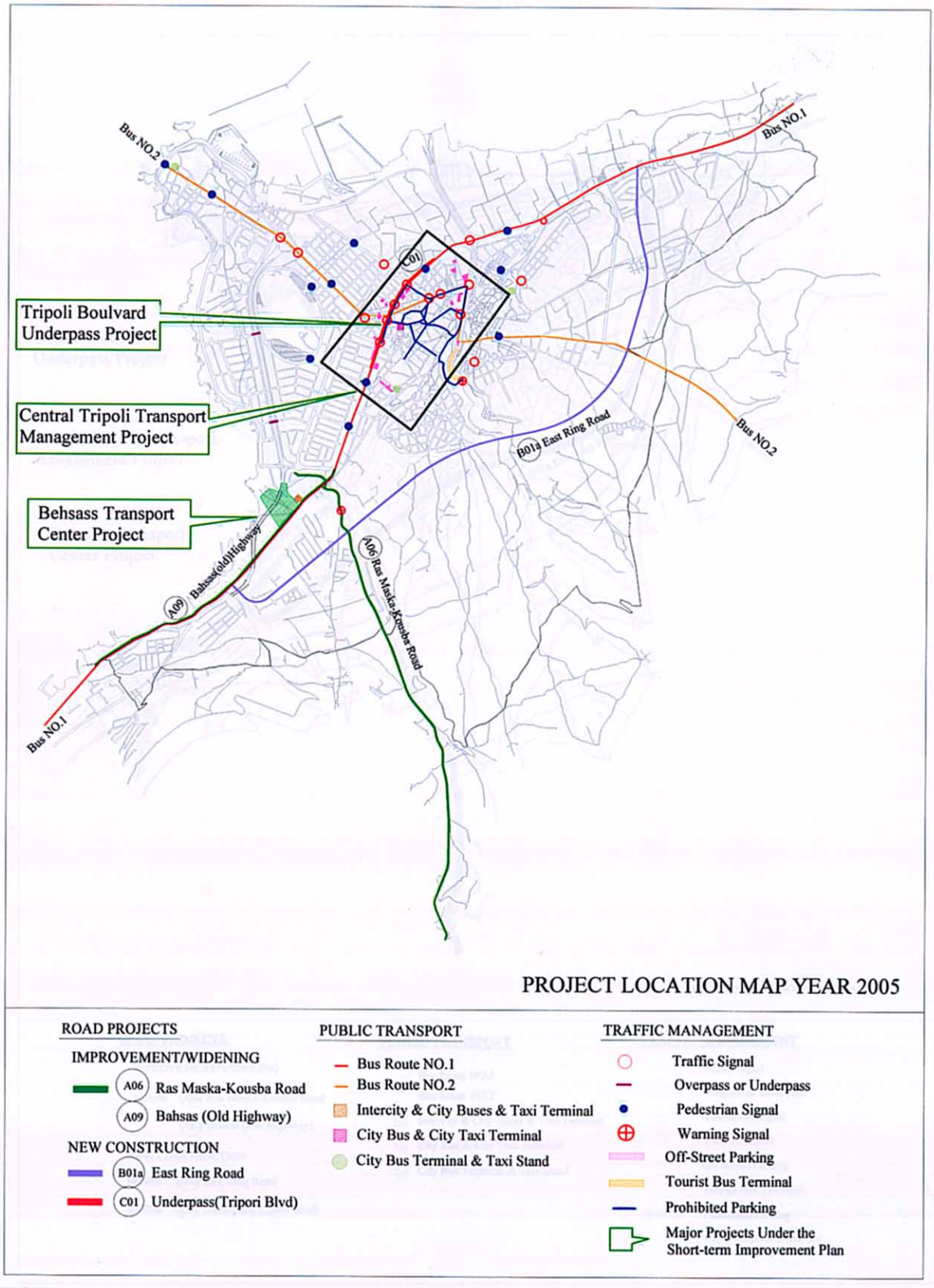

Figure 1.1-2 Location of Short-term Projects